

## 18.0 SITE 19 – LOWER SUBBASE-SOLVENT STORAGE AREA – BUILDING 316 (OU 4)

This five-year review is being conducted for Site 19 at the request of the USEPA. This site is still being investigated under CERCLA, and no decision documents have been prepared for the site.

### 18.1 HISTORY AND SITE CHRONOLOGY

A list of important Site 19 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Solvents stored in Building 316.	NA
Existing Data Summary Report for the Lower Subbase RI completed.	1997
Final Lower Subbase RI completed.	1999
Final FS for soil and groundwater at the Lower Subbase completed.	TBD

### 18.2 BACKGROUND

Site 19 – Solvent Storage Area Building 316, is located in the Lower Subbase, west of Pier 2. The site map is included as Figure 18-1. Several 5-gallon cans containing methylethyl ketone were stored in Building 316 (USEPA, 1995). Solvents are no longer stored in this facility.

Soil and groundwater sampling and analysis were conducted at this site during the Lower Subbase RI (TtNUS, 1999b). This site was included in Zone 4 during the Lower Subbase RI. Because of this approach, the remainder of this section only discusses information in terms of Zone 4.

The Lower Subbase RI (TtNUS, 1999b) recommended that Zone 4 proceed to a FS to evaluate appropriate remedial alternatives. Because of the extensive amount of underground utilities in Zone 4 and the sensitive nature of the activities conducted at this location (i.e., national security), the FS for this zone should focus, to the extent possible, on evaluation of alternatives that rely on institutional controls to limit exposure to contaminated soil and passive and/or in-situ remedial alternatives. In addition, the Zone 4 FS should consider “hot spot” removal actions, in lieu of full-scale excavation. A tiered groundwater monitoring program and cleaning and repair of the Zone 4 storm sewer system should also be evaluated during the FS. These recommendations are based on the following information:

- The nature and extent of organic and inorganic contamination in the soil and groundwater are well defined to the extent practical considering infrastructure limitations.

- The baseline HHRA indicates that there are carcinogenic risks associated with Zone 4 that exceed the USEPA acceptable risk range (i.e., the hypothetical future resident RME scenario) and CTDEP target risk level (i.e., the full-time employee and hypothetical future resident RME scenarios). In addition, modeling performed to evaluate exposures to lead showed that receptors sensitive to lead exposure (i.e., small children and fetuses of pregnant working women) are at risk in Zone 4. All the elevated risks (for lead and other chemicals) were calculated for a future exposure scenario where soils currently covered by pavement or buildings would be available for human contact. Institutional controls and/or “hot spot” removal actions could be used to eliminate this exposure route.
- Evidence suggests that limited organic and inorganic contamination is migrating from the site. Natural attenuation seems to be occurring in the groundwater of Zone 4 and is most likely reducing the concentration and magnitude of petroleum hydrocarbons migrating from the site. Groundwater monitoring will confirm natural attenuation and potential inorganic migration.
- Natural attenuation or bioremediation could be feasible alternatives to remedy the petroleum contamination in the soil.
- A tiered groundwater monitoring program would allow for further actions to be implemented if the results show significant impacts.
- The ERA for the Thames River adjacent to Zone 4 shows that the risks to ecological receptors in this area are relatively low to moderate. Maximum concentrations of several non-AVS inorganics in Zone 4 sediments near the Lower Subase exceeded conservative guidelines (e.g., ER-Ls) indicating that potential risks may be present. Beryllium, boron, cobalt, thallium, and vanadium were retained as COCs since conservative sediment guidelines were unavailable; no alternate guideline was available for barium, whose maximum exceeded the conservative guideline. They were concluded to not be of ecological significance in the NSB-NLON Phase II RI ERA for the Thames River. Benzo(a)pyrene was the only organic in Zone 4 sediments that had maximum concentrations in excess of guidelines. The average concentration of benzo(a)pyrene also exceeded the guideline. The maximum concentration slightly exceeded its ER-M. Despite exceedances of guideline values by several COCs, no significant toxicity was observed in Zone 4 sediment toxicity tests from the NSB-NLON Phase II RI. Low concentrations of some PAHs were detected in a native blue mussel sample collected in Zone 4 as part of the NSB-NLON Phase II RI ERA. Chromium, mercury, and benzo(a)pyrene was not detected in that sample, indicating that they were probably not bioavailable. Boron was detected in the blue mussel sample from Zone 4 and in the blue mussel sample collected south of Zone 4 at concentrations greatly exceeding background and control concentrations. The

toxicological significance is unclear due a lack to toxicity data for that metal. The NSB-NLON Phase II RI concluded that boron was not of ecological significance in the Thames River. The weight of evidence appears to indicate that potential risks to sediment-dwelling organisms from contaminants in Zone 4 sediment are present and that those potential risks are low to moderate.

- The Thames River provides significant dilution and mixing, which minimizes the impact of contaminant migration from Zone 4.
- The Navy removed the waste oil pit at Building 79 and filled the area in with concrete. A recovery well system was installed and operated for a short time in this area. In addition, approximately 800 gallons of petroleum product were removed via pumping from the quay wall area during a removal action in 1994.
- The Navy currently conducts regular pressure testing and repairs on the fuel distribution lines; therefore, the historical source of petroleum contamination has most likely been minimized.
- Zone 4 is covered with pavement or buildings, which minimizes the potential for direct exposure to the contaminated soil by human receptors.
- The groundwater at Zone 4 is not currently or anticipated to be used in the future as a potable water source because it is brackish (classified as GB); therefore, there is no imminent threat to human health.
- The storm sewer system in Zone 4 is a potential a migration pathway for contaminants present in the groundwater.

The Navy subsequently cleaned the Lower Subase storm sewer catch basins in August 2000. Seven catch basins in Zone 4 were cleaned by Fleet Environmental using a vacuum truck. The material removed from the catch basins was containerized, tested (TCLP/TPH), and properly disposed off-site. The storm sewer lines were not surveyed or repaired during the effort. Zone 4 has proceeded to an FS to evaluate appropriate remedial alternatives for the soil and groundwater OUs. The FS is currently being prepared by EA Engineering for the Navy.

### **18.3 REMEDIAL ACTIONS**

#### **18.3.1 Remedy Selection**

A final remedy has not been implemented at Zone 4. Conclusions cannot be made to support the determination that the remedy at Zone 4 is protective of human health and the environment. An FS is currently being prepared to evaluate alternatives for the zone. The Lower Subbase RI recommended that the FS for Zone 4 evaluate a range of remedial alternatives that include institutional controls to limit exposure to contaminated soil and passive and/or in-situ remedial alternatives.

#### **18.3.2 Remedy Implementation**

A final remedy has not yet been chosen for Site 19. The date for finalization of the FS for the Lower Subbase zones is to be determined at this time. After the FS is finalized, a remedy will be selected by the Navy, USEPA, and CTDEP.

### **18.4 FIVE-YEAR REVIEW FINDINGS**

#### **18.4.1 Site Inspection**

A site inspection conducted at Site 19 on April 10, 2001 included visual observations of the building and surrounding areas. Conditions during the inspection were favorable, with mild temperatures and no precipitation. Representatives from the Navy, USEPA, CTDEP, and TtNUS participated in the inspection. No signs of visual contamination or notable signs of impacts from the site were observed. Appendix A contains photographs taken of the site during the inspection.

The area is covered with pavement or buildings and there are no short-term or long-term plans to convert this area to any other use. The Lower Subbase is a high-security area at NSB-NLON.

#### **18.4.2 Document and Analytical Data Review**

The final Lower Subbase RI Report (TtNUS, 1999b) was reviewed for this five-year review. The RI recommended that the soil and groundwater OUs proceed to an FS to evaluate appropriate remedial alternatives. An FS is currently being completed to evaluate alternatives for remedial action at the site. It is expected that a decision document will be signed for the zone prior to the Second Five-Year Review and additional information regarding the document will be provided at that time.

#### **18.4.3     ARAR and Site-Specific Action Level Changes**

A ROD has not been implemented for Zone 4, and therefore it cannot be determined at this time if the remedial actions are protective of human health and the environment.

Also, since a ROD has not been implemented for Zone 4, ARARs and site-specific action levels have not been reviewed to determine if there is a question on the protectiveness of the remedy.

#### **18.5        ASSESSMENT**

A final remedy has not been implemented at Zone 4. Conclusions cannot be made to support the determination that the remedy at Zone 4 is protective of human health and the environment. The results of the Lower Subbase RI do not indicate any imminent threat to human health or the environment.

The Navy has an IR Site Use Restriction instruction in place as of October 2000 at NSB-NLON [SOPA (ADMIN) NLONINST 5090.18]. The policy restricts ground surface disturbance of soils or any subsurface disturbance of soils and/or groundwater at IR Sites.

#### **18.6        DEFICIENCIES**

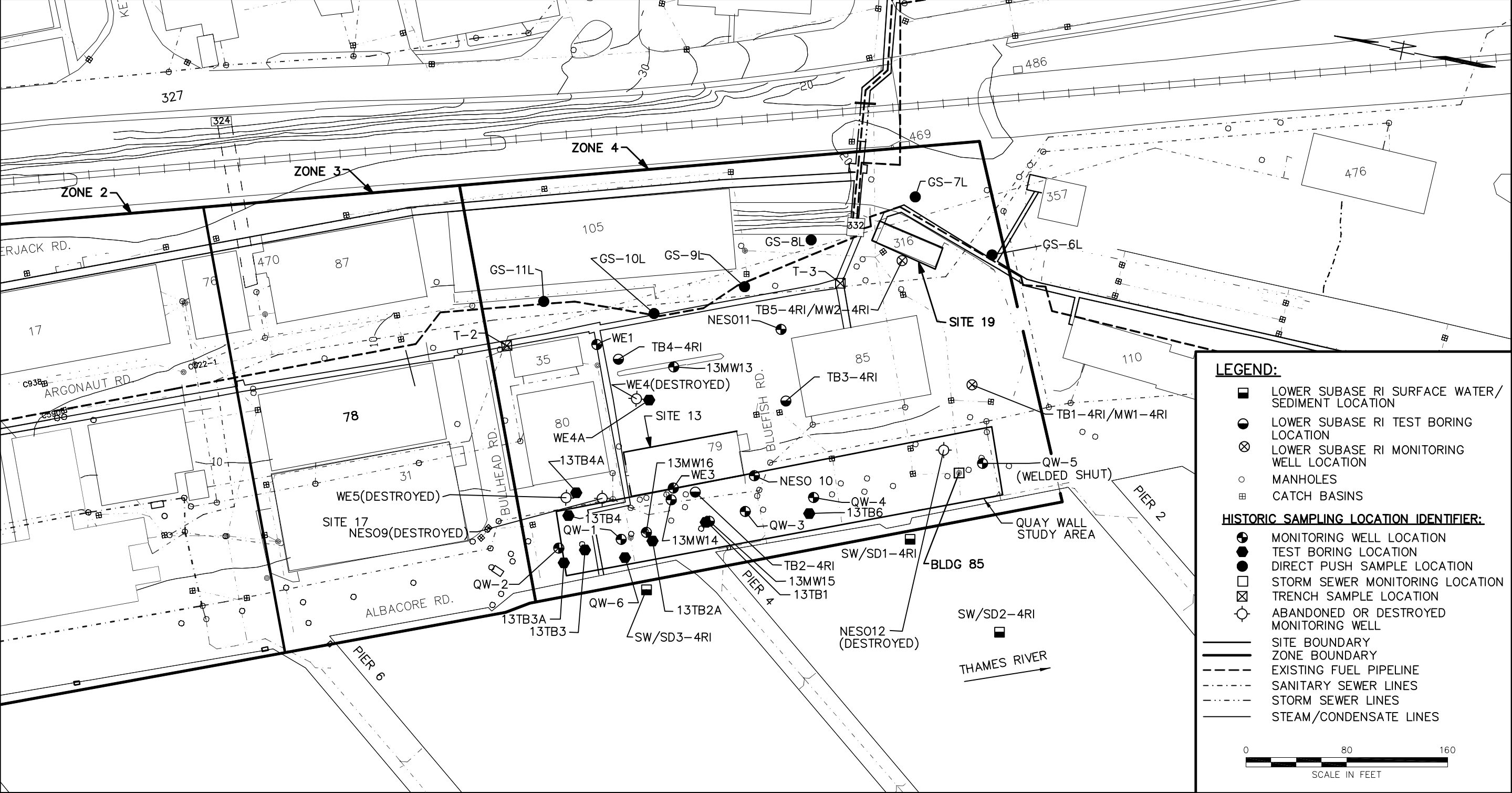
A final remedy has not been implemented at Zone 4, therefore deficiencies cannot be determined at this time.

#### **18.7        RECOMMENDATIONS AND REQUIRED ACTIONS**

It is recommended that the FS be completed to determine the recommended remedial action for Zone 4 that is protective of human health and the environment. An appropriate decision document should be prepared after the FS is completed to document the selected remedial alternative. In addition, it is recommended that there be enforcement of the IR Site Use Restriction instruction.

#### **18.8        PROTECTIVENESS STATEMENT**

A remedy for Zone 4 has not yet been selected by the Navy, USEPA, and CTDEP. The results of the Lower Subbase RI do not indicate any imminent threats to human health or the environment under current land use scenarios. The Navy has an IR Site Use Restriction instruction in place for NSB-NLON. The instructions should minimize unauthorized and unplanned exposure to contaminated media at the Zone.



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY HJP	DATE 5/2/01	Tetra Tech NUS, Inc.	CONTRACT NO. 2863	OWNER NO. 0816
							CHECKED BY	DATE		APPROVED BY	DATE
							COST/SCHED-AREA			APPROVED BY	DATE
							SCALE AS NOTED			DRAWING NO. FIGURE 18-1	REV. 0

## 19.0 SITE 20 – AREA A WEAPONS CENTER

This five-year review is being conducted for Site 20 as a matter of policy since a ROD has been signed for the soil and sediment OUs associated with the site, but the removal action has not been completed yet. The groundwater OU for this site is still being investigated under CERCLA.

### 19.1 HISTORY AND SITE CHRONOLOGY

A list of important Site 20 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Storage of chemicals and chemical wastes generated by Building 524. Weapons storage in bunkers.	Current
Phase II RI Report recommended an FS for Site 20.	1997
Final FS for Site 20 was completed.	June 2000
PRAP for Soil and Sediment published.	May 2000
Public hearing held on the PRAP.	May 23, 2000
ROD for soil and sediment signed.	June 2000
Draft Basewide Groundwater OU RI completed.	August 2001
Remedial Design Work Plan for soil and sediment.	TBD
Remedial Action completed.	TBD

### 19.2 BACKGROUND

Site 20 is the Area A Weapons Center, which is located north of the terminus of Triton Avenue, adjacent to the Area A Wetland. The site map is included as Figure 19-1. The site's location relative to other IR sites is shown on Figure 1-2. The site includes Building 524 and the north and south weapons storage areas. Building 524 is used for administration, minor torpedo assembly, and storage of simulator torpedoes (B&RE, 1997a). No weapons production takes place in this building. Chemicals and chemical wastes, including cleaning and lubricating compounds, paints, adhesives, and liquid fuels, were stored in 1-gallon to 5-gallon containers in seven metal storage cabinets located on a paved area south of the building (B&RE, 1997a). Many of these materials are classified as corrosive or flammable. Building 524 was constructed in 1990/1991. Prior to construction, the area was primarily woodlands. Portions of the site were blasted to remove bedrock during construction.

The north and south weapons storage bunkers are located southeast of Building 524. The southern bunkers are first evident in photographs from 1969, and the northern area bunker is evident in photographs from 1974. Weapons containing liquid fuels, such as Otto fuel, JP-10, and TH Dimer (jet

rocket fuel), are stored in these bunkers (B&RE, 1997a). Routine maintenance and security improvements that are planned for the Area A Weapons Center include grouting and waterproofing of bunkers, repaving of roads, regrading, and culvert installation.

This site was investigated during the Phase II RI (B&RE, 1997). It was found that minimal contamination of surface water and groundwater exists and potential for substantial contaminant transport is low. Therefore, limited action was recommended for this site in the Phase II RI. Although Building 524 is part of Site 20, remedial action in this area is not expected because no impacted soil or sediment has been identified.

A ROD was signed for the soil and sediment OUs associated with Site 20 in June 2000. A minor (200 cubic yards) soil removal action is planned for Site 20 for fall 2001 to address PAH and metals contamination in soil and sediment. The remedial action is targeted toward mitigating direct exposures to soil and sediment.

The groundwater at Site 20 is being further characterized as part of the Basewide Groundwater OU RI. A draft final Basewide Groundwater OU RI Report (TtNUS, 2001e) was completed in February 2001. The objective at Site 20 was to further characterize the nature and extent of groundwater contamination and to quantify the risks to human receptors from the groundwater. In general, organic and inorganic contaminants were detected infrequently and at low concentrations in the groundwater at Site 20. TCE and benzo(a)pyrene were the only organic contaminants identified as groundwater COPCs. Metals identified as COPCs were antimony, arsenic, nickel, silver, thallium, and zinc. High levels of total suspended solids (TSS) and total dissolved solids (TDS) in one sample may be the reason for the elevated concentrations of two metals. All the organic and inorganic COPCs were identified in samples from overburden monitoring wells.

The HHRA determined that risks posed by exposure of construction workers to groundwater at Site 20 are below USEPA and CTDEP acceptable levels, assuming that the workers are exposed to the maximum observed concentrations of site contaminants. The HHRA also evaluated future residential groundwater usage, and calculated risks were above the CTDEP acceptable levels and marginally above the USEPA acceptable risk range based on maximum concentrations. The groundwater, however, is classified by CTDEP as GB groundwater (i.e., not suitable for direct human consumption without treatment) and it is not expected that it will be used for human consumption in the foreseeable future.

Even though contaminant concentrations were generally low and risks are acceptable under the current land use scenario, it was recommended that an FS be prepared for the groundwater OU associated with



Site 20. The FS should evaluate, at a minimum, land use controls and monitoring for the site. This recommendation is made for the following reasons:

- The contaminant source areas are not fully understood, but the current groundwater data (i.e., concentrations and extent) do not indicate that the sources are significant and warrant further investigation to completely characterize them.
- A limited groundwater monitoring program would verify the trend in groundwater contaminant concentrations and determine the impact of any changes in site/source area conditions in the future.
- A change in land use could result in unacceptable risks to potential receptors.

### **19.3 REMEDIAL ACTIONS**

#### **19.3.1 Remedy Selection**

Site 20 has a ROD for soil and sediment that was signed in June 2000. The RAOs are to

- Minimize potential human exposure to COCs above clean-up levels that will ensure that carcinogenic risk levels do not exceed  $1 \times 10^{-5}$  and non-carcinogenic risks do not exceed an HI of 1.0.
- Minimize the potential migration of COCs from soil into groundwater.
- Minimize potential transport of COCs from Site 20 into the Area A Wetlands or the Area A Downstream Watercourses.

The selected remedy addresses principal and low-level wastes in soil and sediment, including PAHs and inorganic constituents. The selected remedy for soil and sediment at Site 20 is selected excavation with asphalt batching or off-site disposal (residential scenario). The following major components of the selected remedy are needed to address soil and sediment contamination at Site 20:

- Excavation of all soil and sediment containing PAHs and metals in excess of medium-specific residential clean-up goals.
- Off-site asphalt batching (treatment using thermoplastic stabilization/solidification) of excavated media or disposal at an offsite, licensed disposal facility if asphalt batching is not available in the State of Connecticut at the time of excavation.

- Collection of confirmatory samples from bottom and sidewalls of the excavation to confirm that material exceeding the media specific cleanup levels has been removed.

The remediation goals for the remedial action are summarized below.

Constituent of Concern	Cleanup Level	Basis of Cleanup Level
<b>SOIL</b>		
Arsenic	9.62 mg/kg	Risk Assessment
Benzo(a)anthracene	1.0 mg/kg	CTDEP RSR
Benzo(a)pyrene	1.0 mg/kg	CTDEP RSR
Benzo(b)fluoranthene	1.0 mg/kg	CTDEP RSR
Chrysene	1.0 mg/kg	CTDEP RSR
Dibenzo(a,h)anthracene	1.0 mg/kg	CTDEP RSR
<b>SEDIMENT</b>		
Arsenic	19.27 mg/kg	Risk Assessment
Benzo(a)pyrene	4.08 mg/kg	Risk Assessment
Dibenzo(a,h)anthracene	4.08 mg/kg	Risk Assessment

Groundwater at Site 20 will be addressed as part of the Basewide Groundwater OU RI and will be addressed under a separate ROD.

### **19.3.2     Remedy Implementation**

A Remedial Design Work Plan for soil and sediment at Site 20 is currently being completed by Foster Wheeler for the Navy. The planned sequence of action with regard to soil and sediment contamination for Site 20 is as follows:

- The Navy will excavate soil and sediment that contain COCs in concentrations exceeding the clean-up levels.
- Soil and sediment will be removed from Drainage Area 1. Soil and sediments in Drainage Areas 2 and 3 are expected to be below clean-up levels and do not require remediation. These areas will be sampled to ensure that all soil and sediment concentrations at the Area A Weapons Center are below remediation goals.
- The affected soil and sediment will be temporarily stockpiled on site.
- Confirmatory soil and sediment samples will be collected from the bottom and sidewalls of the excavation and sent to a laboratory for PAHs and inorganic analyses to confirm that material

exceeding the medium-specific clean-up levels has been removed. At least 5 samples will be taken at each excavation location (one from the bottom and each sidewall of the excavation) and one sample will be taken per 10 feet along the drainage swale. In addition, one sample per 100 cubic yards of excavated material will be collected for waste characterization.

- The excavated area will be backfilled with clean soil, the drainage swales will be regraded, and disturbed asphalt will be replaced.
- Asphalt batching is the preferred disposal option. The excavated soil will be treated using thermoplastic stabilization/solidification (e.g., asphalt batching). In the event that asphalt batching is not available, the soil will be disposed at an off-site, licensed disposal facility. The final disposal location will depend on the actual volume of excavated and the results of the waste characterization samples.
- Safety precautions will be taken during excavation, loading, and transporting activities to minimize fugitive dust emissions.

The estimated time for design and construction of the soil and sediment alternative is up to 1 year. The estimated capital cost is \$63,300.

The remedial action is planned to be completed in the fall of 2001.

## **19.4 FIVE-YEAR REVIEW FINDINGS**

### **19.4.1 Site Inspection**

A site inspection conducted at Site 20 on April 11, 2001 included visual observations of the drainage areas to be remediated and surrounding asphalt and the outsides of buildings. Representatives of the Navy and TtNUS participated in the inspection. Conditions during the inspection were favorable, with mild temperatures and no precipitation. No significant observations were noted. Appendix A contains photographs taken of the site during the inspection.

Future land use at Site 20 is likely to remain the same. NSB-NLON has no plans to cease base operations. The site is located in a high-security area.

#### **19.4.2 Document and Analytical Data Review**

The soil and sediment ROD (Navy, 2000a) and Basewide Groundwater OU RI (TtNUS, 2001a) were reviewed for this five-year review. A summary of these documents is presented below.

A review of the Decision Document for the soil and sediment at Site 20 indicates that a decision was made to remediate soil and sediment at the site. The following were determined to be COCs:

- COCs in soil for residential exposure scenario are arsenic, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and dibenz(a,h)anthracene.
- COCs for the residential scenario for sediment are arsenic, benzo(a)pyrene, and dibenzo(a,h)anthracene.

Surface water at Site 20 does not present an unacceptable adverse impact to human health and the environment. Groundwater contamination that may exist at the site will be addressed under a separate ROD for the groundwater OU (Navy, 2000a).

A review of the draft Basewide Groundwater RI Report indicates that contaminant concentrations were generally low and risks are acceptable under the current land use scenario; however, it was recommended that an FS be prepared for the groundwater OU associated with Site 20. It was recommended that the FS should evaluate, at a minimum, land use controls and monitoring for the site (TtNUS, 2001a).

#### **19.4.3 ARAR and Site-Specific Action Level Changes**

As discussed above, a soil and sediment removal action is scheduled to be completed at Site 20 in the summer/fall of 2001. The chemical-specific, location-specific, and action-specific ARARs and TBCs for the remedial action are summarized in Tables 19-1, 19-2, and 19-3, respectively. Soil and sediment clean-up levels were the more stringent of either of the Connecticut RSRs or site-specific actions levels that were calculated in the FS (EA Engineering, 2000b). There have been no changes in Connecticut RSRs or risk assessment methodology that would call into question the protectiveness of the remedy or change the site-specific action levels.

### **19.5 ASSESSMENT**

The remedial action for Site 20 has not yet begun. The remedy for soil and sediment at Site 20 recommended in the ROD is expected to be protective of human health and the environment. There are

no immediate threats to human health or the environment. The site is located in a high-security area surrounded by a fence and guards. Contaminants of concern consist of PAHs and arsenic.

Groundwater at Site 20 will be addressed as part of the Basewide Groundwater OU and will be addressed under a separate ROD.

The Navy has an IR Site Use Restriction in place as of October 2000 at NSB-NLON [SOPA (ADMIN) NLONINST 5090.18]. The policy restricts ground surface disturbance of soils or any subsurface disturbance of soils and/or groundwater at IR sites.

## **19.6 DEFICIENCIES**

A remedy has not been implemented at Site 20, and therefore deficiencies cannot be determined at this time.

## **19.7 RECOMMENDATIONS AND REQUIRED ACTIONS**

It is recommended that the remedial action for the soil and sediment be completed at Site 20 and that an FS be completed to determine the necessary actions for groundwater at Site 20. An appropriate decision document should be prepared after the FS is completed to document the selected remedial alternative. Also, it is recommended that there be enforcement of the IR Site Use Restriction instruction.

## **19.8 PROTECTIVENESS STATEMENT**

The remedy for soil and sediment at Site 20 is expected to be protective of human health and the environment upon completion. A remedy for groundwater has not yet been selected by the Navy, USEPA, and CTDEP. Groundwater is not used as a drinking water source and does not pose an imminent threat to human health or the environment. Current land use controls should minimize exposure to currently contaminated soil and groundwater until remedies are implemented.

TABLE 19-1

**CHEMICAL-SPECIFIC ARARs AND TBCs  
SITE 20 - AREA A WEAPONS CENTER  
NAVAL SUBMARINE BASE - NEW LONDON  
GROTON, CONNECTICUT**

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement
<b>FEDERAL</b>				
Cancer Slope Factors		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The alternative would eliminate exposure to contaminants in the sediment and soil through excavation and offsite disposal.
Reference Dose		To Be Considered	These are guidance values used in risk assessment to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to contaminants.	The alternative would eliminate exposure to contaminants in the sediment and soil through excavation and offsite disposal.
<b>STATE</b>				
Remediation Standard Regulations	CGS 22a-133k; RCSA 22a-133k–1 through 3	Applicable	These regulations establish direct exposure and pollutant mobility criteria for contaminated soils based on either industrial or residential use of the site. Requirements are based on ground water in the area being classified by the state as a GB.	The alternative would eliminate exposure to contaminants in the soil through excavation and offsite disposal. The alternative meets residential use standards. This alternative would eliminate exposure to soils with contaminants at concentrations that exceed the GB pollutant mobility criteria.

NOTE: CGS = Connecticut General Statutes.

RCSA = Regulations of Connecticut State Agencies.

TABLE 19-2

**LOCATION-SPECIFIC ARARs AND TBCs  
SITE 20 - AREA A WEAPONS CENTER  
NAVAL SUBMARINE BASE - NEW LONDON  
GROTON, CONNECTICUT**

<b>REQUIREMENT</b>	<b>Citation</b>	<b>Status</b>	<b>Synopsis of Requirement</b>	<b>Action to Be Taken to Attain Applicable or Relevant and Appropriate Requirement</b>
<b>FEDERAL</b>				
Clean Water Act, Section 404	33 USC 1344; 40 CFR Part 230 and 33 CFR Parts 320-323	Applicable	These rules regulate the discharge of dredge and fill materials in wetlands and navigable waters. Such discharges are not allowed if practicable alternatives are available.	Remedial action includes excavation of soil and sediment from the contaminated wetlands and ditches and replacement/restoration with uncontaminated material. Measures will be taken to minimize adverse effects and to replace or restore protected wetland functions and values.
Executive Order 11990 RE: Protection of Wetlands	Executive Order 11990, 40 CFR Part 6, Appendix A	Applicable	This Order requires federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and to preserve the values of wetlands, and to prescribe procedures to implement the policies and procedures of this Executive Order.	Remedial action includes excavation of soil and sediment from the contaminated wetlands and ditches and replacement/ restoration with uncontaminated material. However, measures to minimize adverse effects and to replace or restore protected wetland functions and values will be considered and incorporated into any plan or action wherever feasible.
Fish and Wildlife Coordination Act	16 USC Part 661 <i>et. seq.</i> , 40 CFR 122.49	Applicable	This Order protects fish and wildlife when federal actions result in control or structural modification of a natural stream or body of water.	Appropriate agencies would be consulted prior to implementation to find ways to minimize adverse effects to fish and wildlife from excavating and restoring the contaminated wetlands and waterways.
<b>STATE OF CONNECTICUT</b>				
Inland Wetlands and Watercourses	CGS 22a-37 through 45, RCSA 22a-39-1 through 15	Applicable	These rules regulate all activities in wetlands and watercourses.	This alternative proposes to excavate soil and sediment from the contaminated wetlands and watercourses and restore the areas using uncontaminated material. The substantive requirements of the Connecticut standards will be met to address the alteration of wetlands and watercourses.

NOTE: USC = United States Code.

CFR = Code of Federal Regulations.

CGS = Connecticut General Statutes.

RCSA = Regulations of Connecticut State Agencies.

TABLE 19-3

**ACTON-SPECIFIC ARARs AND TBCs  
SITE 20 - AREA A WEAPONS CENTER  
NAVAL SUBMARINE BASE - NEW LONDON  
GROTON, CONNECTICUT  
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<b>Requirement</b>	<b>Citation</b>	<b>Status</b>	<b>Synopsis</b>	<b>Evaluation/Action to be Taken to Attain Applicable or Relevant and Appropriate Requirement</b>
<b>FEDERAL</b>				
Clean Water Act, Section 402, National Pollution Discharge Elimination System	33 USC 1342; 40 CFR 122 through 125	Applicable	These standards govern the discharge of water into surface waters.	Ground water and surface water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, to meet discharge criteria according to substantive requirements of National Pollution Discharge Elimination System if the discharge occurs onsite.
<b>STATE OF CONNECTICUT</b>				
Water Pollution Control	RCSA 22a-430-1 through 8	Applicable	These rules regulate water discharge to surface water.	Surface water and ground water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, in compliance with these regulations if the discharge occurs onsite.
Water Quality Standards	CGS 22a-426	Applicable	Connecticut's Water Quality Standards establish specific numeric criteria, designated uses, and anti-degradation policies for ground water and surface water.	Surface water and ground water removed from excavations, along with water from the sediment/soil dewatering process, will be treated, if necessary, in a manner which is consistent with the anti-degradation policy in the Water Quality Standards if the discharge occurs onsite.



TABLE 19-3

**ACTON-SPECIFIC ARARs AND TBCs  
SITE 20 - AREA A WEAPONS CENTER  
NAVAL SUBMARINE BASE - NEW LONDON  
GROTON, CONNECTICUT  
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<b>Requirement</b>	<b>Citation</b>	<b>Status</b>	<b>Synopsis</b>	<b>Evaluation/Action to be Taken to Attain Applicable or Relevant and Appropriate Requirement</b>
Hazardous Waste Management: Generator and Handler Requirements, Listing, and Identification	RCSA 22a-449(c) 100-101	Applicable	Connecticut is delegated to administer the Federal Resource Conservation and Recovery Act statute through its state regulations. These sections establish standards for listing and identification of hazardous waste. The standards of 40 CFR 260-261 are incorporated by reference.	Hazardous waste determinations will be performed on all contaminated soils/sediments excavated to determine that levels of regulated constituents do not exceed applicable limits. Any contaminated soils/sediments which exceed applicable limits will be managed in accordance with requirements of these regulations, if necessary. Also, wastes produced from surface water, ground water, and dewatering treatment will be tested to determine whether levels of certain regulated constituents exceed Toxicity Leaching Characteristic Procedure limits.
Hazardous Waste Management: Generator Standards	RCSA 22a-449(c)-102	Applicable	This section establishes standards for various classes of generators. The standards of 40 CFR 262 are incorporated by reference.	Surface water, ground water, and dewatering treatment residues (spent filtration media and activated carbon) could contain high concentrations of regulated constituents. Although the residues are not expected to fail hazardous characteristics, substantive requirements of these regulations will be met.
Hazardous Waste Management: Treatment, Storage, and Disposal Facility Standards	RCSA 22a-449 (c) 104	Applicable	This section establishes standards for treatment, storage, and disposal facilities. The standards of 40 CFR 264 are incorporated by reference.	Any hazardous waste which is treated or temporarily stored onsite as part of the remedy will be managed in accordance with the requirements of this section. This requirement is no longer applicable.

**TABLE 19-3**

**ACTON-SPECIFIC ARARs AND TBCs  
SITE 20 - AREA A WEAPONS CENTER  
NAVAL SUBMARINE BASE - NEW LONDON  
GROTON, CONNECTICUT  
PAGE 3 OF 3**

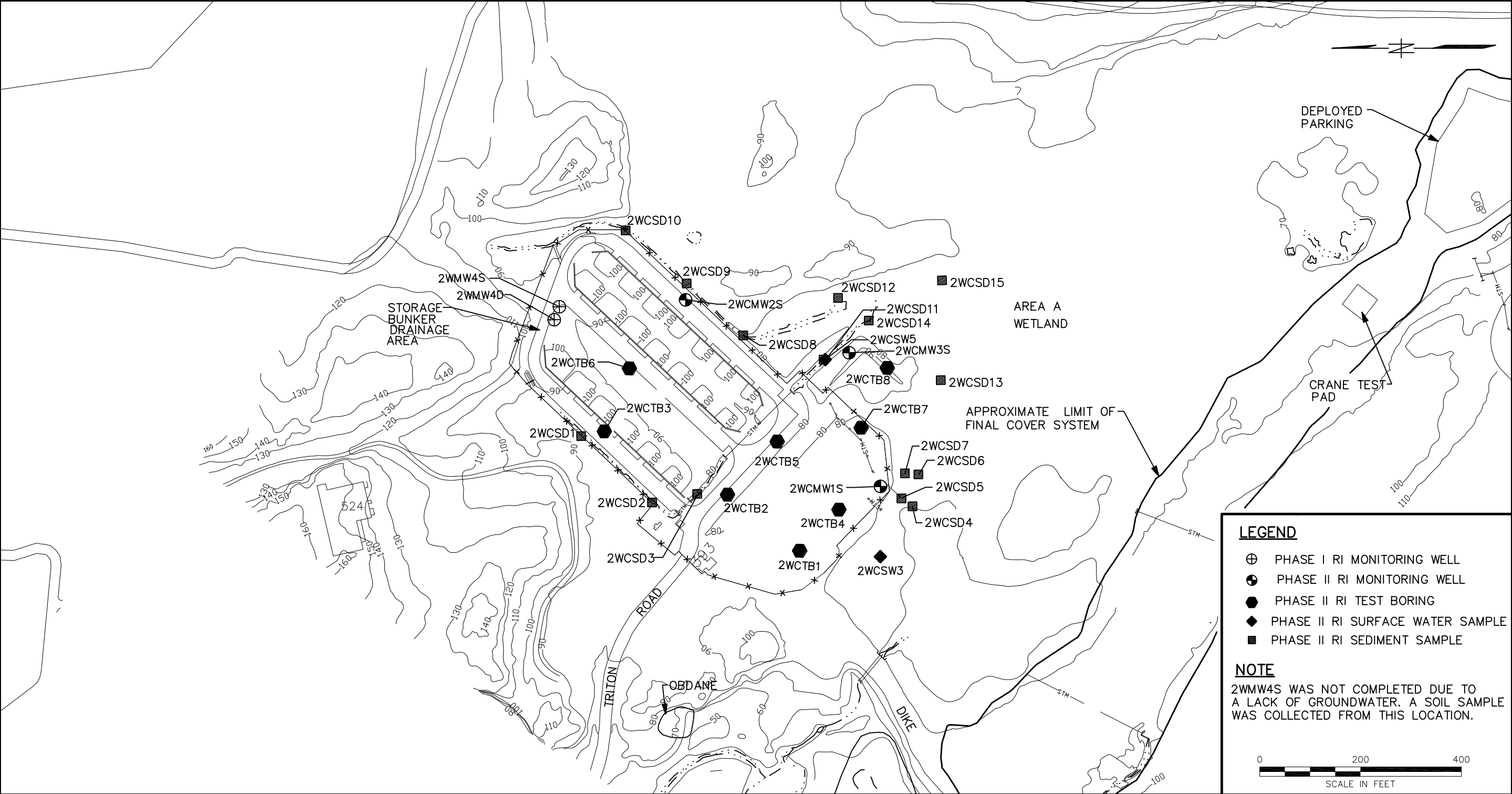
<b>Requirement</b>	<b>Citation</b>	<b>Status</b>	<b>Synopsis</b>	<b>Evaluation/Action to be Taken to Attain Applicable or Relevant and Appropriate Requirement</b>
Air Pollution Control	RCSA 22a-174-18b	Applicable	These regulations require permits to construct and to operate specified types of emission sources and contain emission standards that must be met prior to issuance of a permit. Pollutant abatement controls may be required. Specific standards pertain to fugitive dust (18b).	Emission standards for fugitive dust from excavation and restoration operations will be met with dust control measures. Emissions will be managed to comply with these standards.
Connecticut Guidelines for Soil Erosion and Sediment Control	Connecticut Council on Soil and Water Conservation	To Be Considered	Technical and administrative guidance for development, adoption, and implementation of erosion and sediment control program.	Guidelines will be followed to protect wetland and aquatic resources.

NOTE: USC = United States Code.

CFR = Code of Federal Regulations.

RCSA = Regulations of Connecticut State Agencies.

CGS = Connecticut General Statutes.



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY HJP	DATE 5/2/01	Tetra Tech NUS, Inc.	CONTRACT NO. 2863	OWNER NO. 0816
							CHECKED BY	DATE		APPROVED BY	DATE
							COST/SCHED-AREA			APPROVED BY	DATE
							SCALE AS NOTED			DRAWING NO. FIGURE 19-1	REV. 0

## 20.0 SITE 21 – LOWER SUBASE – BERTH 16 (OU 4)

This five-year review is being conducted for Site 21 at the request of the USEPA. This site is still being investigated under CERCLA, and no decision documents have been prepared for the site.

### 20.1 HISTORY AND SITE CHRONOLOGY

A list of important Site 21 historical events and relevant dates in the site chronology is shown below. The identified events are illustrative, not comprehensive.

Event	Date
Construction of Buildings 103, 173, 106, and 156.	1918 – 1944
Construction of Buildings 456 and 478.	After 1979
Final Site Inspection Report for Berth 16 completed.	1995
Final Lower Subbase RI completed.	1999
Final FS for soil and groundwater for the Lower Subbase being prepared.	TBD

### 20.2 BACKGROUND

Site 21 is Berth 16. Berth 16 is located at the Lower Subbase along the Thames River at the intersection of Amberjack Road and Albacore Road. The site map is included as Figure 20-1. The following structures are currently included in Berth 16 (Atlantic, 1995a):

Building	Original Use	Current Use
103	Instruction	Instruction
173	Substation	Electrical distribution
106	Photolab and electronics	Storage
157	Periscope Shop	Optical Shop
456,478	Maintenance Shop	Maintenance Shop

Berth 16 formerly included a refuse/classified materials incinerator; an underground, 250-gallon, diesel fuel storage tank; and an underground, diesel-fuel transfer line (Atlantic, 1995). The incinerator was located at the current site of Building 478. The incinerator has been separated from Site 21 and is now Site 25. The UST was located adjacent to the northern wall of Building 157, and the underground fuel line extended along Pier 51, east of Building 173. All these items have been decommissioned (Atlantic, 1995a). Sites 21 and 25 were evaluated collectively as Zone 7 during the Lower Subbase RI. Because of this approach, the remainder of this section only discusses information in terms of Zone 7.

Soil, groundwater, and sediment sampling (in the adjacent Thames River) and analysis were conducted at this site in conjunction with the Lower Subbase RI (TtNUS, 1999). The Lower Subbase RI (TtNUS, 1999b) recommended that Zone 7 proceed to an FS to evaluate appropriate remedial alternatives for the soil and groundwater OU. These recommendations were based on the following information:

- The nature and extent of organic and inorganic contamination in the soil are well defined to the extent practical considering the limitations presented by existing infrastructure.
- The baseline HHRA indicates that ILCRs for full-time employees and hypothetical future residents under the RME scenario are in excess of the USEPA acceptable risk range and the CTDEP cumulative target cancer risk level. Noncarcinogenic risks for all receptor groups were less than the USEPA and CTDEP acceptable limit of one, except for the construction workers under the RME scenario. Although the RME HI for the construction workers slightly exceeded unity, adverse impacts are not anticipated since the major contributors (antimony and manganese) to the cumulative risk do not affect the same target organs. Cumulative risks to each individual target organ are expected to be less than unit. In addition, modeling performed to evaluate exposure to lead showed that all receptors (i.e., small children, fetuses of pregnant women, future employees, and construction workers) are at risk in Zone 7. These elevated risks (for lead, as well as other chemicals) assume that, sometime in the future, soils currently covered by pavement or buildings would be exposed and available for human contact.
- Evidence suggests that inorganic contamination (mainly lead) is migrating from the soil to the groundwater.
- Natural attenuation or bioremediation could be feasible alternatives for the petroleum contamination in the soil.
- The Navy has decommissioned the fuel lines that were once within Zone 7. Therefore, the historic source of petroleum contamination has been eliminated.
- The zone is covered with pavement or buildings, which minimizes direct exposure of human receptors to the contaminated soil.
- The data do not suggest that the petroleum contamination in the soil is significantly migrating to the groundwater. In addition, natural attenuation processes seem to be at work in the groundwater. These processes can reduce concentrations of petroleum contamination that reach the aquifer and

convert the petroleum contamination to a less toxic form. Groundwater monitoring will confirm this information.

- A tiered groundwater monitoring program will allow for further actions to be completed if the results show significant adverse impacts.
- The source of the lead contamination in the groundwater is the unsaturated soil of Zone 7. Appropriate remedial alternatives for the Zone 7 soil will be evaluated in the FS. When the appropriate actions are taken, concentrations of lead in the groundwater will decrease.
- The ERA for the Thames River adjacent to Zone 7 shows that maximum concentrations of several non-AVS inorganics in Zone 7 sediments near the Lower Subase exceeded conservative guidelines (e.g., ER-Ls) indicating that potential risks may be present. The AVS/SEM analysis suggests that cadmium, copper, nickel, lead, and zinc are not bioavailable. Beryllium, cobalt, and vanadium were retained as COCs since no conservative sediment guidelines were available; no alternate guideline was available for barium, for which the maximum detected concentration exceeded the conservative guideline. They were concluded to not be of ecological significance in the NSB-NLON Phase II RI ERA for the Thames River. Benzo(a)pyrene was the only organic in Zone 7 sediments that had maximum and average concentrations in excess of guidelines. HQ values were low, 1.39 for the maximum concentration and 1.11 for the average concentration. The maximum concentration of benzo(a)pyrene was much less than its ER-M. Significant toxicity was not observed in Zone 7 sediment toxicity tests from the NSB-NLON Phase II RI using *Leptocheirus*. Survival of *Ampelisca* was significantly lower than survival in reference sediments. Significant mortality was not observed in Pier 17 EA toxicity tests with *Ampelisca*. The Pier 17 EA benthic community analyses concluded that the Pier 15 benthic community was relatively healthy, and the Pier 17 benthic community appeared to be disturbed. Significant bioaccumulation of some PAHs were observed Pier 17 EA bioaccumulation studies with *Macoma* and *Nereis*. Some bioaccumulation of PCBs was noted in *Nereis* but not in *Macoma*. Significant bioaccumulation of inorganics was not observed in either species. Low concentrations of some inorganics and pesticides were detected in a blue mussel sample collected in Zone 7. The weight of evidence appears to be equivocal, suggesting significant potential risks to sediment-dwelling organisms from contaminants in Zone 7 near Pier 17 but not near Pier 15. However, most of the Pier 15 and Pier 17 sediments have been subsequently dredged making interpretation of biological analyses from historical studies difficult. Sediments were replaced with "clean" fill after dredging, which may have ameliorated some of the potential risks. The NSB-NLON Phase II RI suggested that potential risk in the Lower Subase were confined to the Piers 15 and 17 area.

- The groundwater at Zone 7 is not currently or anticipated to be used in the future as a potable water source because it is brackish (classified GB); therefore, there is no imminent threat to human health.
- The Thames River provides significant dilution and mixing which minimizes the impact of any contaminant migration from Zone 7.
- The storm sewer system in Zone 7 is a potential migration pathway for contaminants present in the groundwater.

The Navy subsequently cleaned the Lower Subase storm sewer catch basins in August 2000. Five catch basins in Zone 7 were cleaned by Fleet Environmental using a vacuum truck. The material removed from the catch basins was containerized, tested (TCLP/TPH), and properly disposed off-site. The storm sewer lines were not surveyed or repaired during the effort. The FS is currently being prepared for the Navy by EA Engineering.

## **20.3 REMEDIAL ACTIONS**

### **20.3.1 Remedy Selection**

A final remedy has not been implemented at Zone 7. Conclusions cannot be made to support the determination that the remedy at Zone 7 will be protective of human health and the environment. An FS is currently being prepared to evaluate alternatives for the zone. The Lower Subase RI recommended that the FS for Zone 7, evaluate appropriate remedial alternatives for the soil. Because of the extensive amount of underground utilities in Zone 7 and the sensitive nature of the activities conducted at this location (i.e., national security), the FS should focus, to the extent possible, on the evaluation of alternatives that rely on institutional controls to limit exposure to contaminated soil and passive and/or in-situ remedial alternatives. "Hot spot" removal actions for the lead contamination should also be evaluated during the FS. In addition, it was recommended that the FS evaluate limited action scenarios for the groundwater of Zone 7, in conjunction with the soil remedial alternatives.

### **20.3.2 Remedy Implementation**

A final remedy has not yet been chosen for Zone 7. The date for finalization of the FS for the Lower Subase zones is to be determined at this time. After the FS is finalized, a remedy will be selected by the Navy, USEPA, and CTDEP.

## **20.4 FIVE-YEAR REVIEW FINDINGS**

### **20.4.1 Site Inspection**

A site inspection conducted at Site 21 on April 10, 2001 included visual observations of the asphalt parking lot and groundwater wells in the surrounding area. Representatives of the Navy, USEPA, CTDEP, and TtNUS participated in the inspection. Conditions during the inspection were favorable, with mild temperatures and no precipitation. The current condition of several site monitoring wells was noted during the inspection. It was noted during the inspection that monitoring well 20MW5 was missing its J-plug and protective cover. Monitoring well 20MW6 had a loose lid and was full of sand and gravel. This well's J-plug was also loose. Monitoring well 20MW7 was in good condition. Appendix A contains photographs taken of the site during the inspection.

The area is covered with pavement or buildings, and there is no short-term or long-term plan to convert this area to any other use. The Lower Subbase is a high-security area at NSB-NLON.

### **20.4.2 Document and Analytical Data Review**

The final Lower Subbase RI Report (TtNUS, 1999b) was reviewed for this five-year review. The RI recommended that the soil and groundwater OUs proceed to an FS to evaluate appropriate remedial alternatives. It is expected that a decision document will be signed for the zone prior to the Second Five-Year Review and additional information regarding the document will be provided at that time.

### **20.4.3 ARAR and Site-Specific Action Level Changes**

A ROD has not been signed for Zone 7, and therefore it cannot be determined at this time if the remedial actions are protective of human health and the environment.

Also, since a ROD has not been signed for Zone 7, ARARs and site-specific action levels have not been reviewed to determine if there is a question on the protectiveness of the remedy.

## **20.5 ASSESSMENT**

A final remedy has not been implemented at Zone 7. Conclusions cannot be made to support the determination that the remedy at Zone 7 is protective of human health and the environment.

The Navy has an IR Site Use Restriction instruction in place as of October 2000 at NSB-NLON [SOPA (ADMIN) NLONINST 5090.18]. The policy restricts ground surface disturbance of soils or any subsurface disturbance of soils and/or groundwater at IR Sites.



## **20.6 DEFICIENCIES**

A final remedy has not been implemented at Zone 7, therefore deficiencies in the remedial action cannot be determined at this time. However, during the site inspection, it was noted that several site monitoring wells were missing covers, providing an open conduit from the ground surface to groundwater.

## **20.7 RECOMMENDATIONS AND REQUIRED ACTIONS**

It is recommended that the FS be completed to determine the appropriate remedial action for Zone 7 that is protective of human health and the environment. An appropriate decision document should be prepared after the FS is completed to document the selected remedial alternative. In addition, it is recommended that rehabilitation or abandonment of site groundwater monitoring wells be conducted. Also, it is recommended that there be enforcement of the IR Site Use Restriction instruction.

## **20.8 PROTECTIVENESS STATEMENT**

A remedy at Zone 7 has not yet been selected by the Navy, USEPA, and CTDEP. The results of the Lower Subbase RI do not indicate any imminent threats to human health or the environment under current land use scenarios. The Navy has instituted instructions that restrict excavation activities. The instructions should minimize unauthorized and unplanned exposure to contaminated media at the zone.

